

Adapting the Food Guide Pyramid for Children: Defining the Target Audience

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Nutrition educators, as well as the 1995 Dietary Guidelines Advisory Committee, have identified a need for nutrition guidance specifically for children. Because of the variation in children's nutrient needs and eating practices, it is impractical to adapt one food guide for all children. The purpose of the present study, therefore, was to identify the best age group to target for an adapted Food Guide Pyramid for Children. Three potential subgroups between the ages of 2 and 18 were identified: preschool-age (2 through 6 years), school-age (7 through 11 years), and adolescents (12 to 18 years). Subgroups were ranked by reviewing the literature to determine whether the Food Guide Pyramid meets each subgroup's dietary needs, to consider each subgroup's specific nutritional or health problems that an adapted food guide could help address, and to examine user demand for a new food guide. A food guide adapted for use with parents and caregivers of preschool-age children was identified as the greatest need based on children's specific dietary requirements (higher fat intakes as recommended by the 1995 Dietary Guidelines and their need for smaller serving sizes) and user demand (requests from parents, caregivers, and nutrition educators).

The USDA's Food Guide, designed to help all healthy Americans 2 years old and over use the *Dietary Guidelines for Americans* (38), and its graphic representation, the *Food Guide Pyramid* (Pyramid), have been distributed widely since the Food Guide was first introduced in the mid-1980's. The Pyramid has been used widely in a variety of materials (including posters, textbooks, school curricula, and computer software) by nutrition educators and has also been used by industry on food labels. In materials accompanying the Pyramid, USDA recommends that preschool-age children obtain at least the minimal number of servings from the five major food groups, but this age group can have

smaller servings from all food groups except the milk group (38). Nevertheless, nutrition educators have identified a need for nutrition guidance regarding the dietary needs of children,¹ and the 1995 Dietary Guidelines Advisory Committee has recommended that the development of separate dietary guidelines for children be considered (7). Adaptation of the Pyramid and its accompanying nutrition guidance materials specifically for children is an important component of the effort to help children apply the *Dietary Guidelines for Americans*.

¹The term "children," in this article, refers to children and adolescents ages 2 through 18 years.

The purpose of this study was to define the target audience for a food guide that would be adapted for children by recommending subgroups within the 2- to 18-year age range and ranking the subgroups in order of greatest need based on dietary requirements and user demand for nutrition education materials. Materials reviewed for this study included journal articles, reference materials (including the Recommended Dietary Allowances and nutrition textbooks), and published and unpublished reports from government agencies. Criteria used to define and rank the subgroups included the following:

- nutrient needs of children,
- nutrition recommendations for children by authoritative bodies, such as the Dietary Guidelines Advisory Committee,
- nutritional status of children, including macronutrient and micronutrient intake and anthropometric measurements, and
- children's knowledge and attitudes regarding nutrition.

These criteria were used to define subgroups and to list facts in favor of and against adapting a food guide for each subgroup.

Nutrient Needs of Children

The Recommended Dietary Allowances (RDA) provide information concerning children's nutrient needs, as well as the nutritional needs of the rest of the population (23). The 1989 RDA are expressed for the following age-gender groups: children, ages 1 to 3 years; children, ages 4 to 6 years; children, ages 7 to 10 years; males, ages 11 to 14 years; females, ages 11 to 14 years; males, ages 15 to 18 years; and females, ages 15 to 18 years.

The National Academy of Sciences' Food and Nutrition Board, however, is in the process of replacing these RDA with new dietary recommendations: Dietary Reference Intakes (DRI).² DRI were released recently for calcium, phosphorus, magnesium, fluoride, vitamin D, thiamin, riboflavin, niacin, vitamin B₆, folate, vitamin B₁₂, pantothenic acid, biotin, and choline (31,32). Reference intake values were published for the following age groups: 1 to 3 years, 4 through 8 years, 9 through 13 years, and 14 through 18 years.

The current RDA (or AI for calcium, fluoride, vitamin D, pantothenic acid, biotin, and choline) for children were

- (a) extrapolated from infant or adult research results (vitamins A, K, C, B₆, B₁₂, riboflavin, niacin, folate, biotin, choline, pantothenic acid, selenium, iodine, and manganese),
- (b) based on growth and consumption data (energy, protein, iron, phosphorus, and potassium),
- (c) estimated based on weight (fluoride and vitamin E),

²The DRI, a set of up to four nutrient-based reference values, consist of the Estimated Average Requirement (EAR), Recommended Dietary Allowances (RDA), Adequate Intake (AI), and Tolerable Upper Intake Level (UL). The EAR refers to the daily intake value that is estimated to meet the nutrient requirement in half of the individuals in a given age-gender group. The RDA consist of the average daily intake level that is sufficient to meet the nutrient requirement of nearly all healthy individuals in the age-gender group, based on the EAR. The AI is the daily intake value that is estimated to meet the nutrient requirement of nearly all healthy individuals in the age-gender group and is used when an EAR is not available to calculate the RDA. The UL defines the highest level of nutrient intake that is likely to pose no risks of adverse health effects in almost all individuals in the general population.

- (d) based on studies on balance in children, but not necessarily with all the above age groups (thiamin, zinc, copper, sodium, calcium, and magnesium), or
- (e) estimated based on biochemical markers (vitamin D) (23,31,32).

Because the RDA/AI for children were largely extrapolated or calculated rather than determined directly from studies of children, there is no overriding reason for using the RDA age-gender cutoffs for a children's food guide. Information on children's dietary intakes, nutritional status, and dietary recommendations—as well as information on their attitudes, knowledge, and behavior—must also be considered when determining which groups of children are most in need of nutrition guidance.

Nutrition Recommendations for Children

Recommendations of the U.S. Government

A number of recommendations indicate what constitutes a healthful diet for children. The *Dietary Guidelines for Americans*, the basis of Federal nutrition policy (39), provide advice about food choices that promote health and prevent disease among healthy Americans 2 years old and older. The Guidelines advise Americans to eat a varied diet with plenty of grain products, vegetables, and fruits, while moderating their intakes of fat, saturated fat, cholesterol, sugars, salt and sodium, and alcoholic beverages. In addition to emphasizing the benefits of physical activity, the Guidelines provide some specific advice for children: they should be taught to eat grain products; vegetables and fruits; lowfat milk products or other calcium-rich foods; beans, lean meat, poultry, fish or other

protein-rich foods; and to participate in vigorous physical activity. The Guidelines caution that fat should not be restricted for children younger than age³ 2, that major efforts to change a child's diet should be accompanied by monitoring of growth at regular intervals by a health professional, and that children should not consume alcoholic beverages. The Guidelines also recommend that children between the ages of 2 and 5 should gradually adopt a diet so that it contains no more than 30 percent of calories from fat by the time children are about 5 years old (39).

The report *Healthy People 2010* outlines a national strategy for improving significantly the health of Americans during the 2001 to 2010 decade (42). Included in the 2010 report is a recommendation to reduce fat intake to an average of 30 percent of calories or less and saturated fat intake to an average of less than 10 percent of calories among people 2 years old and older. The National Cholesterol Education Program recommends that total fat intake averages **no more than** 30 percent of calories (24). These recommendations are consistent with the advice given in the 1990 Dietary Guidelines; the 1995 Dietary Guidelines amended this advice, stating that children between the ages of 2 and 5 should gradually reduce their total fat intake so that by age 5, they are consuming no more than 30 percent of calories from fat.

Recommendations of Other Organizations

Several organizations provide dietary advice for children that is consistent with the basic principles of the *Dietary Guidelines for Americans*. The American

Academy of Pediatrics, for example, recommends that children eat a wide variety of foods and consume enough calories to support growth and development and to reach or maintain advisable body weight. The Academy also recommends that children over the age of 2 consume, on average, 30 percent of total calories from fat, less than 10 percent of calories from saturated fat, and less than 300 mg of cholesterol per day. However, the Academy cautions that "recommendations that call for 'less than' 30 percent of calories from fat may lead to the inappropriate use of more restrictive diets" (3).

The American Heart Association (AHA) concurs with the recommendation of the Dietary Guidelines that children between the ages of 2 and 5 gradually adopt a diet containing 30 percent or less of calories from fat. The AHA also agrees with the Dietary Guidelines' recommendation that diets of young children should maintain the primary emphasis on providing adequate calories and nutrients for normal physical activity, growth, and development (17).

Some disagree about the age at which children should adopt a lower fat diet. A joint working group of the Canadian Paediatric Society and Health Canada recommended a longer transition period to a diet lower in fat, compared with that recommended by the Dietary Guidelines. The joint working group advised that the transition from the high-fat diet during infancy (about 50 percent of calories from fat) to a diet that includes no more than 30 percent of calories as fat and 10 percent of calories as saturated fat take place between the age of 2 and the end of linear growth (about age 14 for females and 15 for males) (14). The rationale for the working group's recommendation was based on (1) lack of

Other studies have also concluded that it is safe to recommend that fat intake be limited to 30 percent of calories and saturated fat intake to less than 10 percent of calories for children 5 years old and older

³In this paper, the use of the terms "age" and "ages" refers to age in years, unless stated otherwise.

evidence that consuming a diet providing 30 percent of calories as fat and 10 percent of calories as saturated fat would either reduce illness in later life or provide short-term health benefits and (2) concerns that some children consuming a diet with low fat intakes have lower energy intakes and low intakes of some nutrients.

To support their position, the Canadian Paediatric Society and Health Canada cited a publication from the Bogalusa Heart Study in which 24-hour recalls were obtained from about 870 10-year-olds whose diets were stratified by fat intake: those with less than 30 percent of calories from fat had lower intakes of many nutrients than did children with higher fat intakes. The children with the lower percentage of calories from fat also had higher intakes of simple carbohydrates (25). The children enrolled in the Bogalusa Study had not been exposed previously to any dietary intervention programs. Therefore, it cannot be concluded, on the basis of the Bogalusa Study, that children—whose parents and caregivers have been instructed on how to moderate dietary fat intake—will be unable to meet their nutrient requirements on a diet containing 30 percent of calories from fat.

Other researchers have concluded that children can safely follow diets containing 30 percent of calories from fat. The Dietary Intervention Study in Children (DISC) is an ongoing, randomized study that is a controlled clinical trial of diets containing lowered fat, saturated fat, and cholesterol. About 660 children ages 8 to 10 who were enrolled in 6 centers, located around the country, were assigned randomly to either control groups or groups receiving behavioral intervention to promote their following a diet providing 28 percent of calories

from total fat, less than 8 percent of calories from saturated fat, and less than 150 mg of cholesterol (less than 75 mg/1,000 calories) per day. After 3 years, dietary levels of total fat, saturated fat, and cholesterol and blood levels of low-density lipoprotein cholesterol (LDL-C) decreased significantly in the intervention group, compared with the control group. The two groups, however, did not differ significantly on measures of growth and development: Height, red-blood-cell folate values, serum zinc, retinol and albumin levels, sexual maturation, and psychosocial health.

The DISC study found that children grew and developed normally after being instructed on consuming a lower fat diet. The children in the intervention group also had lower LDL-C levels than the controls. The researchers concluded, therefore, that the diet was effective as well as safe (19). Other studies have also concluded that it is safe to recommend that fat intake be limited to 30 percent of calories and saturated fat intake to less than 10 percent of calories for children 5 years old and older (26,29,35).

Another recommendation regarding children's diets addresses their requirements for dietary fiber. The Dietary Guidelines recommend that individuals 2 years and older choose a diet with plenty of grain products, vegetables, and fruits to provide adequate fiber. But the Guidelines do not set specific numerical goals for fiber intake. The American Health Foundation published a recommendation that a child's fiber intake be equivalent to his or her age plus 5 grams (g) a day ("age + 5"), with the recommendation ranging from 8 g a day for a child age 3 to 25 g a day for a person age 20 (44).

Nutritional Status of Children

Dietary Intake—Energy

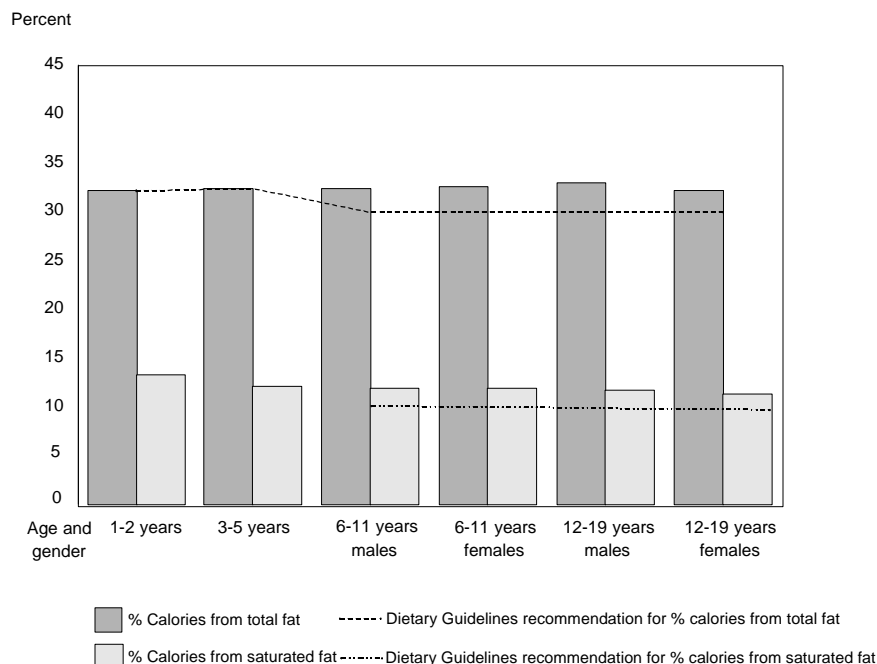
Data on children's food consumption are provided by several national surveys: DHHS's National Health and Nutrition Examination Survey (NHANES III), USDA's Continuing Survey of Food Intakes by Individuals (CSFII), and the Market Research Corporation of America (MRCA) (1,10,16,37). Median energy intakes below 100 percent of the RDA for several age-gender groups were reported in NHANES III results (10). The CSFII 1994-96 reported that over half of the children 5 years old and younger had energy intakes below the RDA, and about 20 percent had energy intakes below 75 percent of the RDA. About 60 percent of males and 75 percent of females 6 to 19 years old had energy intakes below the RDA (37).

Rather than a reflection of actual low intakes of energy by children, these low intakes of energy could be the result of underreporting the foods eaten or of low energy expenditures by children. Several studies have reported that preschool-age children have energy expenditures lower than the RDA (6,11,12). In contrast, the prevalence of overweight among children has been increasing (36). According to CSFII 1994-96, about 5 to 10 percent of all children have energy intakes at or above 150 percent of the RDA (37).

Dietary Intake—Macronutrients and Fiber

Food consumption surveys report that, on average, children are consuming more than 30 percent of calories from total fat and more than 10 percent of calories from saturated fat (fig. 1) (1,10,16,37). Kennedy and Goldberg, using CSFII 1989-91 data, reported that over three-fourths of all children exceeded

Figure 1. Percent of calories from total fat and saturated fat in children's diets exceeds recommendations



recommendations for total fat and saturated fat (15). Improvement was slight by 1994, when roughly two-thirds of all children exceeded the recommendation for total fat and saturated fat (16). Because of the Guidelines' recommendation for gradual adoption of a diet low in fat, concern is greater for children 5 years and older than it is for children 2 to 5 years old. The CSFII 1994-96 also reported that adolescent males are consuming more than 300 mg/day of cholesterol, the upper limit of cholesterol intake listed on the Nutrition Facts label (37).

Other studies have confirmed the findings regarding children's fat intake: most are consuming more than the recommended levels. About ninety 3- to 5-year-old children enrolled in the Framingham

Children's Study⁴ consumed an average of 33 percent of calories from fat (28). Albertson and Tobelmann, analyzing 1986-88 MRCA data, reported that among 825 children ages 7 to 12, those who frequently ate ready-to-eat cereal (7 or more times in 14 days) consumed a lower percentage of calories from fat, compared with others who consumed ready-to-eat cereals less frequently: 2 to 6 times in 14 days or less than 2 times in 14 days. However, all three groups consumed more than 30 percent of calories from fat (2).

Data from the CSFII 1994-96 showed that young children's mean intakes of

⁴The longitudinal Framingham Children's Study examined factors related to the development of dietary habits and patterns of physical activity during childhood.

dietary fiber met the "age + 5" recommendation of the American Health Foundation. Children 5 years old and younger had mean fiber intakes of about 11 g a day. However, older children began to fall short of the fiber recommendations: males and females 6 to 11 years old consumed about 14 g and 12 g of fiber per day, respectively; their counterparts 12 to 19 years old consumed about 17 g (males) and 13 g (females) per day (37).

Dietary Intake—Micronutrients

American children are more likely to get adequate amounts of vitamins and minerals than they are to meet Dietary Guideline recommendations for total fat and saturated fat intake. However, some nutrients are consumed at levels below recommended amounts by some groups

in the U.S. population. For example, vitamin E and zinc are consumed at levels below 100 percent of the RDA by most children 2 to 19 years old (37). According to CSFII 1994-96, on the days surveyed, only about 60 percent of children 5 years and younger, 60 percent of females 6 to 11 years old, and only 28 percent of females 12 to 19 years old consumed 100 percent or more of the RDA for iron. Only about one-third each of males and females 12 to 19 years old consumed 100 percent or more of the RDA for vitamin A (37).

Calcium is another nutrient that children consume at levels below recommendations. Average calcium consumption is below the 1989 RDA for children 12 to 19 years old (fig. 2). In 1994-96, about half of the children 11 years old and younger consumed 100 percent or more of the 1989 RDA for calcium; just over one-third of males 12 to 19 years old and about 15 percent of females 12 to 19 years old consumed 100 percent or more of the calcium RDA (37). Even fewer children ages 9 and older would meet the new Adequate Intake for calcium, which increased to 1,300 mg (31).

Compared with other children, adolescents, particularly adolescent females, had the greatest problems in meeting their nutrient requirements. Adolescent females reported the lowest energy intakes in proportion to their energy requirement (37). Findings of MRCA data from 1991-94 show that most adolescents ages 11 to 17 consumed less than 2 servings (the minimal number recommended) of fruits a day. Twelve percent of adolescents consumed no fruits in a given day (45). Krebs-Smith et al. examined 3-day data from CSFII 1989-91 for children and adolescents 2 to 18 years old. Even after foods were separated into their

component ingredients (e.g., credit is given for vegetables in mixed dishes, such as on pizza or in sandwiches), only one in five children consumed the recommended 5 servings of fruits and vegetables a day. One-quarter of all vegetables that were consumed were French fries. Children from families with higher income consumed more servings of fruits and vegetables, compared with children from families with lower income (18).

Data from the CSFII 1994-96 also showed that children's intake of fruits and vegetables was low. Only about one-fourth of children 2 to 11 years old consumed the minimal 3 servings of vegetables a day that are recommended by the Pyramid, and only about 40 percent of females and 55 percent of males 12 to 19 years old met the minimal number of servings. About half of all 2- to 5-year-olds consumed the minimal 2 servings of fruit a day recommended by the Pyramid, but this dropped to about one-fourth for males and females 11 to 19 years old (37). Low intakes from one food group could explain some of the low nutrient intakes, particularly for vitamins A and C and folate.

Sodium intakes for many children are higher than 2,400 mg a day, its upper limit (listed on the Nutrition Facts label). Children 6 years old and older had median sodium intakes greater than 2,400 mg a day according to NHANES data (which includes allowances for salt added at the table and sodium in water and medications) (10). In the CSFII 1994-96 (which reports only sodium intake from food), the mean sodium consumption for all children 3 years old and older exceeded 2,400 mg a day. Mean sodium consumption for males ages 12 to 19 years was 4,407 mg a day (37).

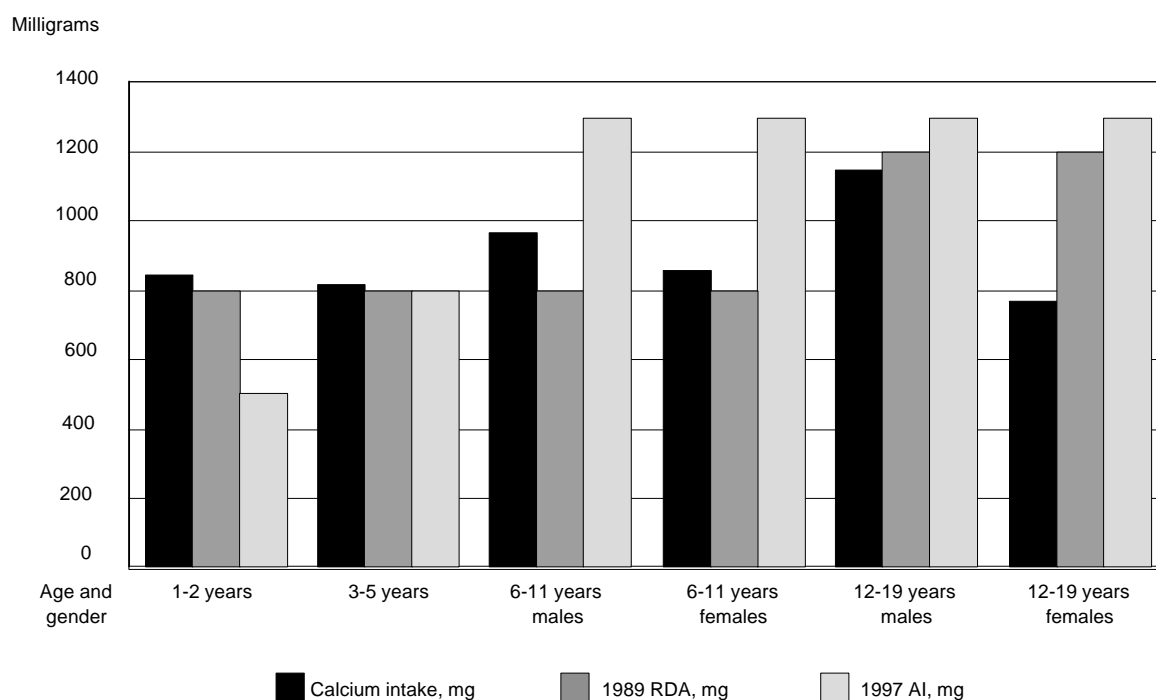
Anthropometric Indices

Weight and height indicators from NHANES III show that underweight is a concern for about 5 percent of 2- to 17-year-olds (only 2 percent of 12- to 17-year-old females) (10). Overweight, when defined as a weight for height greater than the 95th percentile, occurred in 10.9 percent of children ages 6 through 17 (36). When overweight was defined as a weight for height greater than the 85th percentile, the incidence of overweight increased to 22 percent (36). The prevalence of overweight increased between 1963-65 and 1988-91 among all age-gender groups, with the greatest increase occurring between 1976-80 and 1988-91 (36).

A study of the prevalence of overweight among preschool-age children 2 months through 5 years old found that overweight among 4- and 5-year-old females increased from 5.8 percent in 1971-74 to 10 percent in 1988-94. Overweight was defined, in this study of NHANES data, as being above the 95th percentile of the appropriate measures of the National Center for Health Statistics: weight-for-length or weight-for-stature growth curve. The prevalence of overweight did not increase among younger children. However, the increase in prevalence of overweight in children as young as 4 years old suggests that efforts to prevent overweight should begin in early childhood (27).

The increase in obesity is surprising, because many children are reporting energy intakes below the RDA. Lack of physical activity may be responsible for the increase, and the number of hours children watch television has been linked to obesity in this age group (8).

Figure 2. Mean calcium intakes of older American children below recommended levels



Consumer Research— Children’s Knowledge and Attitudes About Nutrition

When adapting a food guide for children, USDA staff believe it is useful to find out what children know about nutrition, what their attitudes are about foods and nutrition, and what nutrition education programs have been successful. Children have been the target audience for some qualitative and quantitative studies; however, information about their knowledge and attitudes regarding nutrition is far more scarce than information about adult’s knowledge and attitudes.

Qualitative Studies

In late 1991, in preparation for developing nutrition labeling materials for children,

KIDSNET, Inc., an organization working on children’s educational issues (in cooperation with the U.S. Food and Drug Administration [FDA]), sponsored mini-focus groups (3 children in each group) with children 6, 8, and 12 years old. The focus groups were designed to examine children’s attitudes and behavior regarding food, as well as their awareness and knowledge of the relationship between nutrition and food. Six focus groups (with a mixture of racial and income groups) were conducted in the Washington, DC, area. The children reported having some influence over the foods they eat, particularly breakfast cereals, snack foods, and lunches. Some 6-year-olds even reported making their own lunches.

Results from the mini-focus group showed that the children’s age influenced their knowledge of nutrition. Twelve-year-old children could name food groups and were aware that carbohydrate, protein, fat, vitamins, and minerals are found in food. Younger children did not have a clear understanding of food groups, and many children thought of vitamins as products that come in a bottle from the drugstore. However, even though the 12-year-old children were fairly knowledgeable about nutrition, their knowledge did not carry over to their own dietary patterns. Taste, instead, was their primary consideration in making food choices. In the words of one 12-year-old participant: “We hear ‘Eat right. Don’t do drugs.’ It’s getting boring, like a broken record, so we just tune it out” (30).

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The FDA sponsored two focus groups, each consisting of six to eight females 13 to 15 years old from various racial and ethnic groups. The purpose of the focus groups was to determine the types of nutrition messages the participants would find compelling and to determine which format(s)—for messages about calcium—the participants would most likely pay attention to. These focus groups were held in the Washington, DC/Baltimore, MD, metropolitan area.

The results revealed that the participants had a fairly good knowledge of nutrition; they could name nutrients and make associations between a nutrient and its function, for example, “calcium makes your bones strong.” Participants said they tended to pay more attention to eating a healthful diet when they were actively involved in a sport. (Most were active in at least one sport.) A frequently mentioned barrier to healthful eating was related to school lunches: lunch periods were often rushed and at odd hours of the day. Participants expressed a preference for educational materials that contained bold, bright colors and little or no text (21).

The International Food Information Council sponsored one focus group with 9- to 12-year-old children and another with 13- and 14-year-olds to evaluate a prototype nutrition brochure. All of the participants had seen the Food Guide Pyramid, and all said they already knew about the importance of eating vegetables, fruits, and grain products. The participants, however, believed these concepts were “boring, because everyone knows that,” and they believed that information about eating breakfast, smart snacking, and balance was important. They also thought information about physical activity was important but believed that activities portrayed should be relevant

to their age group. Activities such as golf and racquetball were perceived as “adult” sports (9).

Because these studies were conducted using locally available samples and were conducted in urban areas, the results must be interpreted cautiously and cannot be generalized to all children.

Quantitative Studies

The Kellogg Company surveyed children about their nutrition knowledge, attitudes, and behavior. A nationally representative school-based survey was conducted in 1988-89 with 5,000 students in Grades 3 through 12. Over half of the respondents in this survey believed nutrition is “very important”; however, nutrition was considered less important by older children than by younger ones. Almost three-quarters of elementary school students considered nutrition “very important,” compared with about half of junior high school students and only about one-third of high school students (13).

The Kellogg survey also found that the positive attitudes of many children did not always translate into appropriate behavior, confirming the results of the qualitative studies referred to earlier in this paper. Only about one-third of all school-age children responded “often” (rather than “sometimes” or “rarely”) to the statement “I eat the right foods.” Children who agreed strongly with the statement that too much cholesterol and saturated fat are bad for health reported eating foods high in these components as often as did other children, thus demonstrating that their knowledge did not change their behavior. The authors of the Kellogg survey suggested that lack of *sufficient* knowledge could be partially responsible for this disconnect—the children might know that excessive

dietary cholesterol and saturated fat are unhealthful, but they may not know which foods are rich sources of these components (13).

Lack of adult supervision could also account for some of the poor eating habits reported by the participants of the Kellogg survey. About 60 percent of children reported coming home to an empty house at least once a week, with more than one-third coming home alone three or more times a week. These “latchkey” children were more likely to report that they, rather than their parents, have more control over what they eat (60 percent of “latchkey” children; 35 percent of all elementary schoolchildren).

Eating away from home frequently could influence children’s diets. According to USDA’s CSFII 1994-96, about 40 percent of children 5 years old and younger and over two-thirds of children 6 to 19 years old reported eating at least one food item away from home on the day of the survey. The most frequently mentioned sources of food away from home were fast-food restaurants, school or day care, someone else or gift, and stores (37).

The Kellogg Survey also found that almost one-third of school-age children believed they were overweight (13). This figure is somewhat higher than the 22 percent of children 6 to 17 years old who were found to be overweight by NHANES III. This difference raises a possibility: some children whose weight is normal think they are overweight. Thus dieting is a common behavior among children; about 40 percent of all school-age children participating in the Kellogg Survey reported having been on a diet. More females than males reported dieting, and most of the children

who reported dieting did so for cosmetic reasons rather than for health (13).

Lack of physical activity has been cited as a possible reason for the increase in the percentage of children who are overweight (6,8,11,12). The Kellogg Survey, on the other hand, found that schoolchildren do consider exercise to be important. Elementary schoolchildren reported taking part in physical activity over five times a week; high school students reported being involved in physical activity about four times a week (13).

The Youth Risk Behavior Survey, a component of the Youth Risk Behavior Surveillance System (Centers for Disease Control and Prevention), is a national school-based survey of students in Grades 9 through 12. It contains a series of questions, parts of which are nutrition- or diet-related. Male students responding to this survey were significantly more likely than female students to consider themselves the “right weight” or “underweight” (86 vs. 66 percent). Female students were significantly more likely than male students to report trying to lose weight at the time of the survey (44 vs. 15 percent). Over one-fourth of female students who considered themselves the “right weight” reported trying to lose weight. And female students were significantly more likely than their male counterparts to report either currently or ever having used inappropriate practices to lose weight: such as, skipping meals, taking diet pills, or inducing vomiting (40).

The Youth Risk Behavior Survey asked students in Grades 9 through 12 how often they participated in vigorous activity in the 2 weeks preceding the survey. Vigorous activity was defined as “at least 20 minutes of hard exercise that made you

breathe heavily and made your heart beat fast” (41). About one-third of all students reported being vigorously active three or more times a week, but female students were half as likely than male students to report regular vigorous activity (25 vs. 50 percent), and African American students were less likely than White or Hispanic students to report regular vigorous activity (30 vs. 40 and 35 percent, respectively) (41).

Studies of Nutrition Education Programs—What Works

USDA conducted research to evaluate adults’ comprehension and perceived usefulness of its food guide and to develop a graphic presentation of the food guide (43). USDA also conducted research to determine the effectiveness of the resulting graphic of the Food Guide Pyramid with three target audiences: children, consumers with less than a high school education, and low-income consumers. USDA, in 1991, collaborated with DHHS and contracted with private industry (4) to develop and test graphic alternatives (including a bowl, shopping cart, and dinner plate) to the Food Guide Pyramid for conveying the key concepts of variety, proportionality, and moderation.

Qualitative findings indicated that children preferred the Pyramid graphic to the alternatives tested. They, as well, learned the most information from the Pyramid. Teachers also preferred the Pyramid as a teaching tool, compared with the alternatives (4). For the quantitative phase of the research, interviewers questioned 3,017 individuals, including 1,523 children in Grades 2 through 10. The children’s responses to the 60-item questionnaire indicated that the Pyramid graphic conveyed the concepts of variety, proportionality, and moderation. Younger children (Grades 2 to 3),

The Center selected the preschool-age group (2 to 6 years) as the target audience for an adapted food guide

however, understood variety more so than proportionality and moderation (4).

Effectiveness of Nutrition Education Programs

The Food Guide Pyramid adapted for children needed to integrate relevant findings from a recent comprehensive review on the effectiveness of methods used in nutrition education. This review revealed that programs using educational methods directed at behavioral change as a goal were more likely than other programs to be successful—that is, they were more likely to result in some behavioral change than were programs that focused on only distributing information (5).

Contento et al. recommended that programs be behaviorally based and appropriately designed for the child's stage of cognitive development (5). Preschool and early elementary school-age children (4 to 7 years) need activities that allow them to modify their environment. Providing food-based activities and having adults model eating behavior are appropriate for this age group. Also, parents' or other caregivers' involvement with children in this age group is an important factor contributing to success. Older elementary school-age children (8 through about 11 years) still need to have information presented in concrete terms. Food-classification activities and modeling by adults are appropriate for this age group, and involvement with parents and the community is still important for programs targeted for this age group.

Adolescents (second decade of life) move from concrete to abstract thinking and are able to comprehend more abstract information, such as the relationship between diet and health—present and

future. They need activities that encourage critical thinking, such as exploring the influence of diet on health and the environment. With this age group, parents' involvement becomes less important, because adolescents are more likely to be influenced by their peers than by their parents or caregivers (5).

The quantity and quality of existing nutrition education materials for specific age groups of children must also be considered when selecting a target audience. Recently, Swadener reviewed research related to nutrition education for preschool-age children (33), and Lytle reviewed research related to nutrition education for school-age children (20). Both found that while many nutrition education materials are directed toward children, improvements and follow-up are needed to determine whether the materials are really effective.

Swadener found that many nutrition education materials developed for preschoolchildren did not include an evaluation component, many programs were not conducted for a sufficient time to result in changes in attitudes or behavior, and few programs were designed for use with children from dysfunctional or marginally functional families. Lytle concluded that more tools are needed for assessment of change in children's and adolescents' eating behavior and that adolescents, in particular, could benefit from exposure to strategies that modify behavior. Lytle also found that more programs are needed: ones that target multi-ethnic groups as well as involve families of school-age children.

Pros and cons of adapting the Food Guide Pyramid for use with three groups of children

Pros	Cons
<i>Preschool age (2 through 6 years)</i>	
Have special needs, re: fat, smaller serving sizes	Educational materials must target parents and caregivers, not child directly
Peer pressure not a problem	Fat message (children this age need more fat) may confuse parents, because this need is temporary
Can reach them through the Special Supplemental Feeding Program for Women, Infants, and Children and the Child and Adult Care Feeding Program	
Developmentally a good time to reach (e.g., when food habits are still being formed)	
Can counteract exposure to television advertising of high-calorie foods	
Not as many materials targeting this age group as for older children	
<i>Elementary school age (7 through 11 years)</i>	
Think nutrition is important but don't act on it; they are "reachable"	Already a large amount of nutrition education material available for this audience (however, not all of it is relevant or appropriate)
Beginning to take more responsibility for their own food choices	Current food guide already meets nutrient needs
Easier to reach (through a single classroom teacher) than younger or older children (where nutrition education may be provided by a diverse group of individuals)	
<i>Adolescents (12 to 18 years)</i>	
More problems meeting nutrient needs	Current food guide already meets nutrient needs
Not many materials targeting this audience	Difficult audience to reach—need different ways to communicate food guide, not necessarily different food guide
Make many of own food choices	Need more individualized messages—e.g., for athletes vs. nonathletes
Perhaps can turn weight concerns into motivation for change	

Decision Point—Target Audience for the Food Guide Pyramid for Children

Because of differences in nutrient needs (23,31,32), current food consumption patterns (10,16,37), and stages of educational development (5), a single food guide cannot meet the needs of all children 2 to 18 years old. Based on children's nutrient needs and developmental level, staff of the Center for Nutrition Policy and Promotion identified three age groups for which a Pyramid could be developed:

- Preschool and early elementary age (2 through 6 years)
- Elementary school age (7 through 11 years)
- Middle and high school age (12 to 18 years)

The Center staff considered several factors when deciding which age group should be targeted for an adapted food guide:

- Does the existing food guide meet this group's dietary needs, or does this group have specific nutritional and health problems that an adapted food guide could help to address?
- If the existing food guide meets the group's dietary needs, has it been successful in influencing the group's behavior? Is there a need for an alternate presentation of the existing food guide to better reach this group?
- What nutrition education materials exist for this audience?
- What are the educational considerations for this group? Will children be able to use the new food guide directly? Will they use the materials with guidance from a parent or caregiver? Or will the materials be developed for the parent or caregiver?

- Is there user demand for a new food guide for this group?
- What is the social effect of the decision? Will different food guides for different ages create confusion?

Based on these factors, Center staff listed pros and cons for developing an adapted food guide for each age group (table) and considered these issues when making the decision regarding the target audience.

Implications and Recommendations for a Food Guide for Preschool-Age Children (2 to 6 Years)

The Center selected the preschool-age group (2 to 6 years) as the target audience for an adapted food guide because there is a greater need for verifying the scientific basis of the food guide, both from a physiological and developmental viewpoint for 2- to 6-year-olds than for older children. The rationale for this conclusion follows:

- Nutrient needs of preschool-age children differ from those of older children. The *Dietary Guidelines for Americans* recommend that the level of dietary fat be gradually decreased from current levels (about 34 percent of calories from fat) to 30 percent of calories by the time the child is about 5 years old (39). Concerns about undue food and fat restrictions for children in this age group, leading to "failure to thrive," have been expressed by the American Academy of Pediatrics (3). Because the current Food Guide Pyramid assumes a dietary fat intake of 30 percent of calories, Center staff concluded that additional guidance is needed for parents and caregivers of children less than 5 years old.

- Following the release of the Food Guide Pyramid, USDA received numerous questions from the Extension Service; the Dairy Council; the Special Supplemental Food Program for Women, Infants, and Children (WIC); the Child and Adult Care Food Program; and the media. The concern: how to use the food guide with young children, particularly regarding children's need for smaller serving sizes.
- Developmental concerns regarding food activities at the preschool level include determining what young children can or should "learn" and addressing the physiological and emotional issues related to food. Because parents and caregivers have a major role in food selection for this age group, Center staff believed these children's attitudes and behavior must also be considered.

Adaptation of the food guide for this age group uses the same framework of food groups as the original food guide. Thus the framework blends into later learning activities in school where concepts are added, for example, nutrient content of different types of foods; how foods are grown, processed, and delivered; how different food items are used in different cultures; and how "new" foods have been historically introduced into the American diet. Using the same framework of food groups also makes the new food guide more practical for family food managers to use. The process used to adapt the food guide for the preschool and early elementary-age audience is described elsewhere in this issue (22,34).

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